Manual Classification

A Tutorial for the Beverly, MA , Image

The following tutorial is provided as an example of how a manual interpretation land cover map is made for the Beverly, MA, TM image. See Figure TK-4. After completing this tutorial as a training exercise, each step presented should also be done by your students, but using the TM image of your own area (both the original 512 X 512 pixel TM image, and color enlargements made by the teacher and distributed to groups of students). Figure TK-4 shows a false-color infrared image of a 101 by 101 pixel (3 km x 3 km) enlargement of the Beverly, MA image. The enlarged area is Manchester-by-the-Sea, MA, and will be used to illustrate the process of performing a "manual" land cover classification. Note that water and vegetation types are much more readily distinguished if the false color IR image is used to make the land cover map.

The following steps are used in the manual interpretation method:

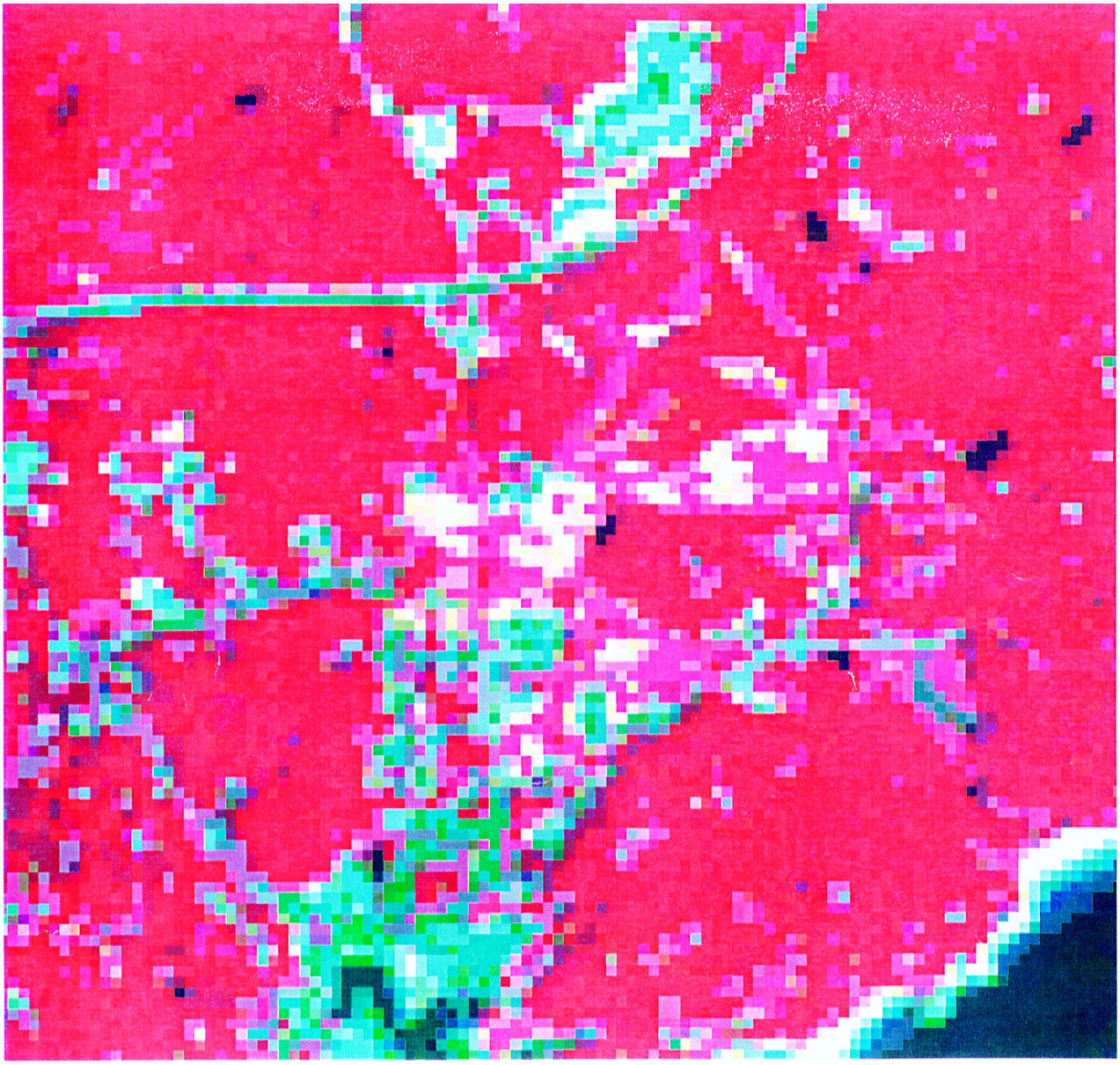
1. Select the Landsat TM image to be mapped (the 3 km X 3 km Manchester-By-The-Sea false color IR print provided as Figure TK-4.) In the false color IR image, actively growing green vegetation will appear red (hardwoods and fields are bright red, evergreens are dark red to black), water is black, while urban areas and bare soils are blue. This image has been enlarged from the original 512 X 512 pixel (15 km X15 km) image of Beverly, MA, to produce Figure TK-4. You may choose to do this using an enlarging color xerox, or you may need to arrange to print copies from your Landsat file, using MultiSpec. You may have four or more small groups of students working on different enlarged portions of the original 512 X 512 pixel image of your area.
2. Overlay an 8.5 X 11 inch sheet of clear plastic on top of the colored print of the image, using tape to hold it firmly in place. Once the overlay is in place, mark the location of the image edges on the overlay so that it can be placed in exactly the same position if it is removed. This will also allow you to place the overlay on either the true color image or the false color IR image in order to take advantage of the discrimination capabilities of each type of image.
3. The classification process involves carefully outlining the different land cover types seen on the image, using either colored crayons or felt-tip marking pens. Use different colors to represent each different land cover class, and assign to each the appropriate number for its specific MUC Level 4 land cover classification (MUC is the Modified UNESCO Classification system. It can be found in the *Land Cover/Biology Investigation*.)

- Outline the water bodies as shown in Step 1 using the MUC Level 2 class 72 for Marine, 63 for tidal river, and 64 for a lake (note that in some cases, no Level 3 or Level 4 categories have been developed for the MUC system).
- Outline the urban/transportation features next, and shown in Step 2. The MUC category 93 (transportation) is assigned in this case.
- Outline urban features next, as shown in Step 3. These features include commercial and industrial (#92); residential (#91); and a golf course, labeled "other" (#94).
- Finally, outline the various forest vegetation types, such as 0192 to indicate evergreen forests typical of eastern Massachusetts, 0222 for mixed hardwoods and softwoods, and 0231, for mainly hardwoods (deciduous), as shown in Step 4.

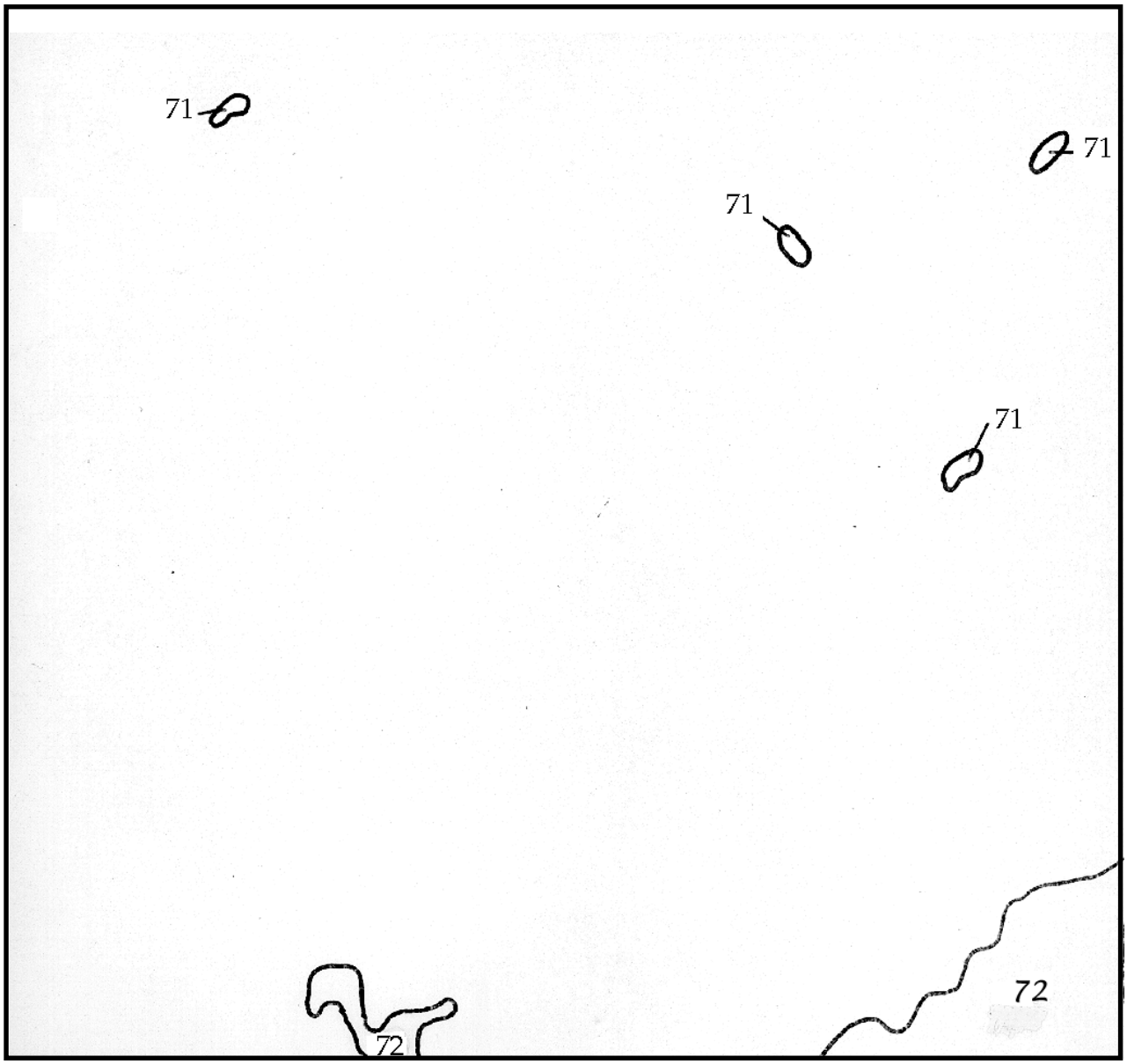
The final product (Step 4) represents a land cover map for the Manchester-By-The-Sea, MA, area. In this example, it will not be

possible for you and your students to field check any of the questionable cover types (ie, the gravel pit marked with a question mark (?) in Step 3). If your students are not sure of a specific area or class for your own images, have a discussion as to what the class might be and ask a student living near the area to provide a ground assessment on the way to or from school. This activity is likely to take several class periods to complete. Ask your students to be as careful and specific as possible in outlining and assigning classes to the various patterns seen on their images. Good Luck!!!

Figure TK-4: Beverly Landsat Scene



Step 1

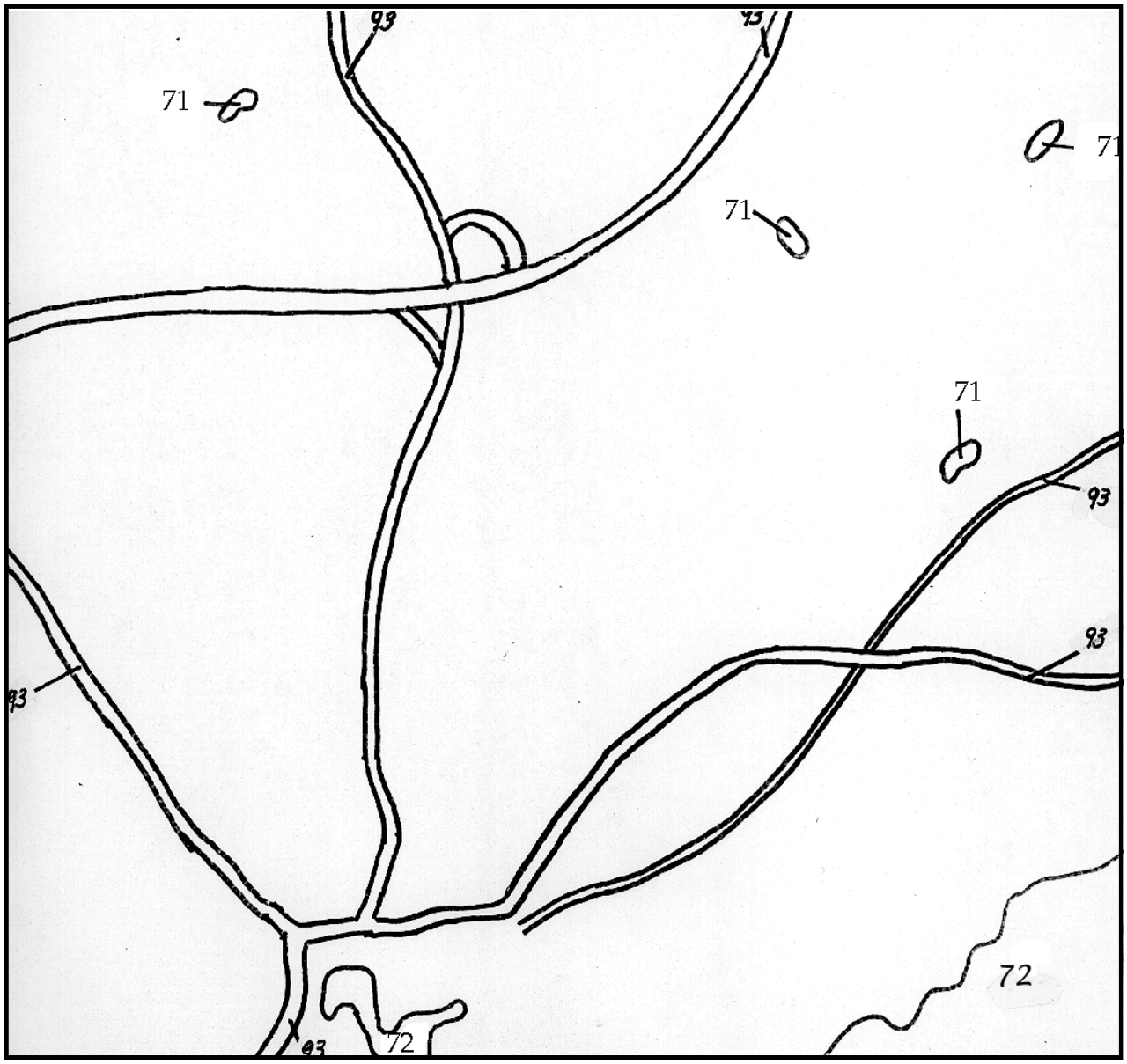


Step 1: Areas of water are outlined

72=marine

71=freshwater

Step 2

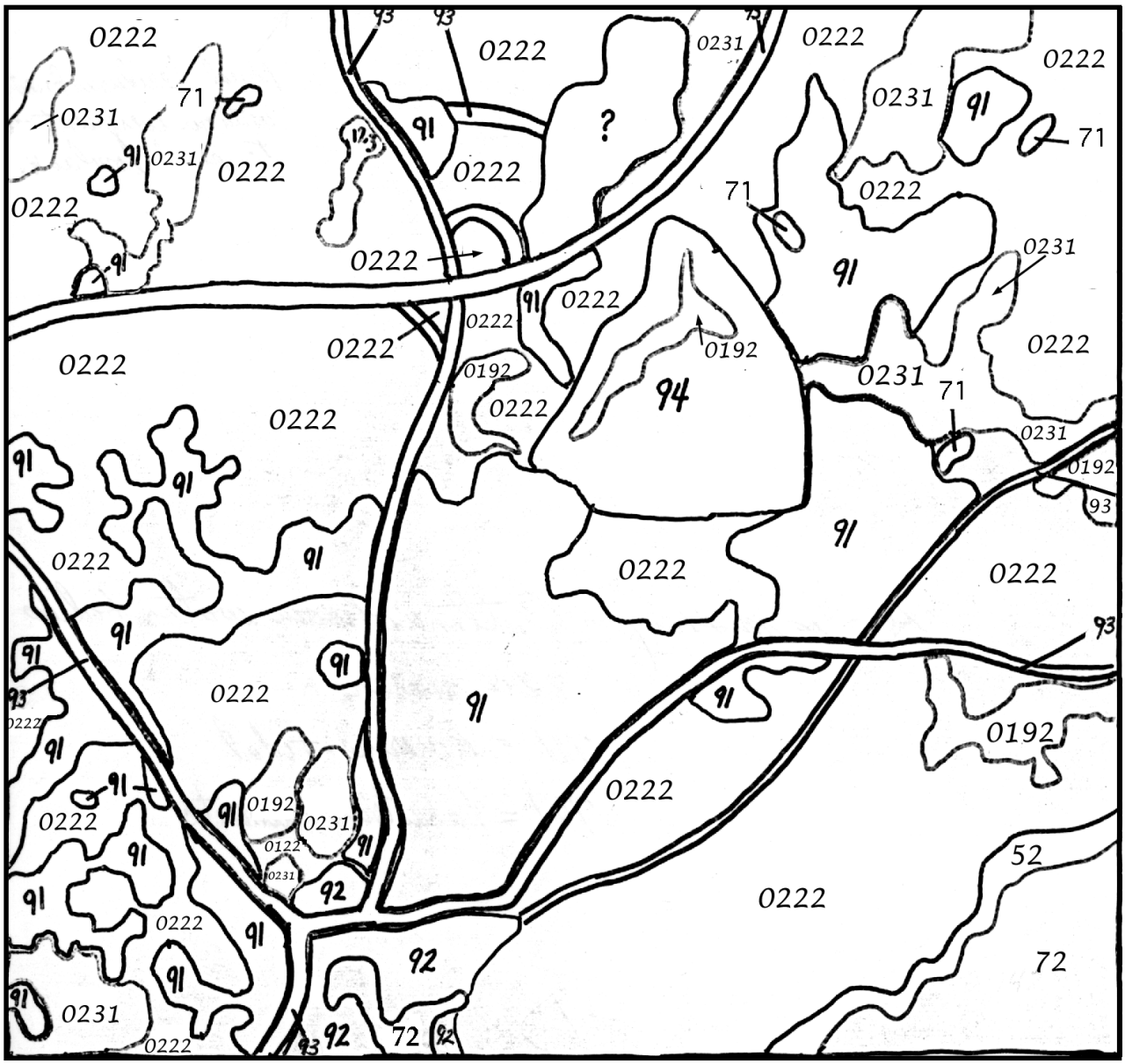


Step 2: Transportation features are outlined (roads, railways, etc)

Step 3

Step 3: Outline Urban Features (residential areas, commercial and industrial areas, etc.) Note that the gravel pit (? area) looks like commercial but needs to be ground checked.

Step 4



Step 4: Vegetated areas are outlined for the final step.

0192=Evergreens

0222=Mixed hardwood/softwood-mainly deciduous forest with some evergreens

0231=Hardwood(deciduous)-mainly deciduous forest without evergreens